Conel

A B&B ELECTRONICS Company

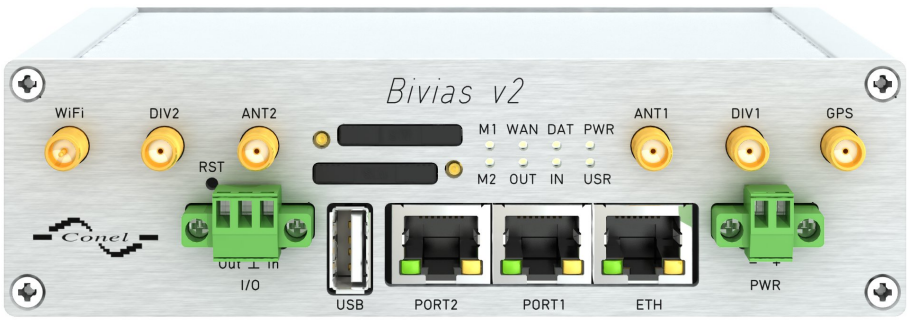
LUCOM

The connecting & monitoring company

Two modular concept router

Bivias v2

USER'S MANUAL



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Used symbols

Danger – important notice, which may have an influence on the user's safety or the function of the device.

Attention – notice on possible problems, which can arise in specific cases.

Information, notice – information, which contains useful advice or special interest.

GPL license

Source codes under GPL license are available free of charge by sending an email to:

info@conel.cz.

Conel s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic
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1. Safety instruction

Please, observe the following instructions:

- The router must be used in compliance with all applicable international and national laws and in compliance with any special restrictions regulating the utilization of the router in prescribed applications and environments.
- To prevent possible injury to health and damage to appliances and to ensure that all the relevant provisions have been complied with, use only the original accessories. Unauthorised modifications or utilization of accessories that have not been approved may result in damage to the router and in a breach of applicable regulations. Unauthorized modifications or utilization of accessories that have not been approved may result in the termination of the validity of the guarantee.
- The router can not be opened.
- Before handling of the SIM card turn off the router and disconnect it from power supply.
- **Caution!** The SIM card could be swallowed by small children.
- It must not be exceeded by the maximum voltage 30 V DC power connector on the router.
- Do not expose the router to extreme ambient conditions. Protect the router against dust, moisture and high temperature.
- The router should not be used at petrol stations of flammable and explosive materials. We remind the users of the duty to observe the restrictions concerning the utilization of radio devices at petrol stations, in chemical plants, or in the course of blasting works in which explosives are used.
- Switch off the router when travelling by plane. Utilization of the router in a plane may endanger the operation of the plane or interfere with the mobile telephone network, and may be unlawful. Failure to observe these instructions may result in the suspension or cancellation of telephone services for the respective client, or, it may result in legal sanctions; it may also result in both eventualities.
- When using the router in the close proximity of personal medical devices, such as cardiac pacemakers or hearing aids, you must proceed with heightened caution.
- If it is in the proximity of TV sets, radio receivers and personal computers, the telephone may cause interference.
- It is recommended that you should create an appropriate copy or backup of all the important settings that are stored in the memory of the device.

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2. Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques to minimize the impact on the environment. This product contains high quality materials and components which can be recycled. At the end of it's life this product MUST NOT be mixed with other commercial waste for disposal. Check the terms and conditions of your supplier for disposal information.

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3. Router description

Conel router Bivias v2 is equipped with two independent communication modules for wireless connectivity of various equipments and devices via Ethernet interface 10/100 to the internet or intranet. Each module can and should use the infrastructure of another cellular service provider. This router allows customer to combine modules for different mobile technologies – LTE or HSPA+ technology on the first module position and LTE, HSPA+ or CDMA technology on the second position. Due to high download and upload speed is this device an ideal wireless solution for traffic and security camera systems, individual computers, LAN networks, automatic teller machines (ATM) and other self-service terminals and machines.

As a standard, Bivias v2 router is equipped with one Ethernet 10/100, one USB Host port, one binary Input/output (I/O) port and two SIM cards. The wide range of interface options of this router further expands an expansion ports designated as PORT1 and PORT2 which are mounted on the customer's request. For PORT1 is available Ethernet port 10/100. PORT2 may be equipped with WIFI wireless interface. Both of ports can be fitted with internal switch (exp. port SWITCH). This wireless router is supplied in a metal casing.

Configuration is done via web interface protected by password. The router supports creation of VPN tunnels using technologies IPsec, OpenVPN, L2TP to ensure safe communication. Web interface provides detail statistics about the router activities, signal strength, detailed log, etc. Cellular router supports functions: DHCP, NAT, NAT-T, DynDNS, NTP, VRRP, control by SMS and many other functions.

Other diagnostic functions ensuring continuous communication include automatic inspection of PPP connection offering an automatic restart feature – in case of connection losses, or hardware watchdog which monitors the status of the router. With the help of a special window (start up script window) you may insert Linux scripts for various actions. For some applications the key option to create several different configurations for one wireless router, the so-called profiles (maximum of 4), and the option to switch between them (for example via SMS, binary input status, etc.) is essential. Cellular wireless routers may automatically upgrade configuration and firmware from server. This allows mass reconfiguration of many routers in one time.

For easy use additional software may be used – communication VPN server Digicluster and software for router monitoring R-SeeNet.

Examples of possible applications

- mobile office
- fleet management
- security system
- telematic
- telemetric
- remote monitoring
- vending and dispatcher machines

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4. Contents of package

Basic delivered set of router includes:

- router,
- power supply,
- crossover UTP cable,
- up to three external antennas,
- clip for the DIN rail,
- installation CD containing instructions,
- paper start guide.

Figure 1: Contents of package

The router can also be supplied as expansion accessories:

- Two expansion ports: ETHERNET,SWITCH or WIFI. Separation columns for mounting expansion boards are included.

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5. Router design

5.1 Router versions

Bivias v2 router is supplied in the following versions:

	Box	SIM1	SIM2	I/O	USB	PORT1	PORT2	ETH
Bivias v2 LL SL	Metal	✓	✓	✓	✓	✓	✓	✓
Bivias v2 LH SL	Metal	✓	✓	✓	✓	✓	✓	✓
Bivias v2 LC SL	Metal	✓	✓	✓	✓	✓	✓	✓
Bivias v2 HH SL	Metal	✓	✓	✓	✓	✓	✓	✓
Bivias v2 HC SL	Metal	✓	✓	✓	✓	✓	✓	✓

Table 1: Router versions

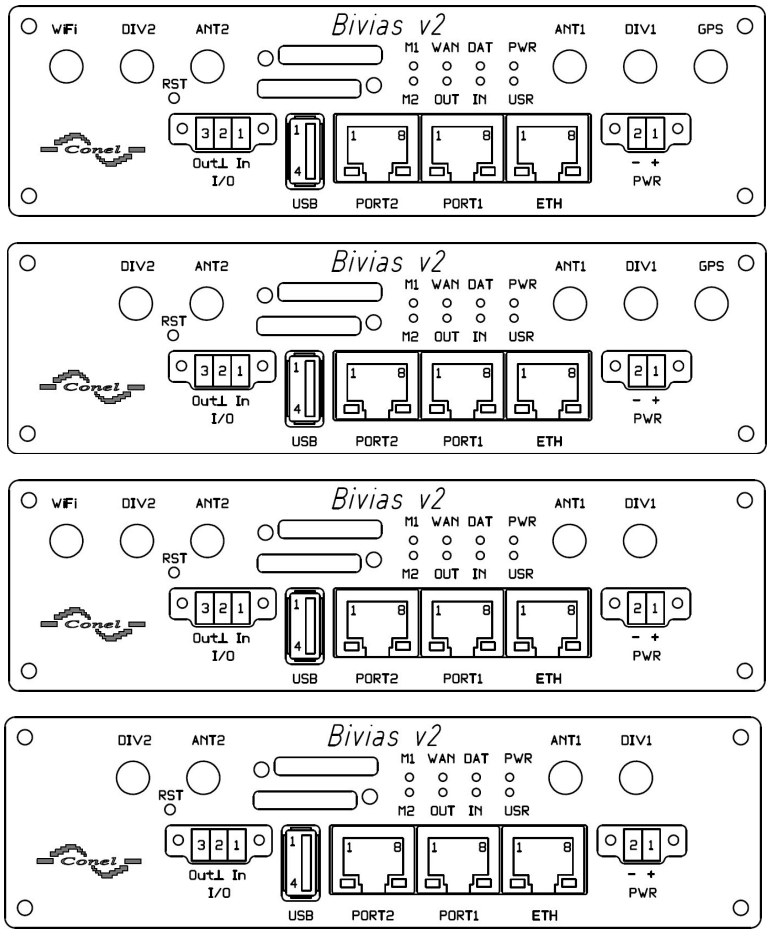

Figure 2: Front panels of Bivias v2 SL

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5.2 Delivery identification

Trade name	Type name	Other
Bivias v2 LL SL	Bivias-v2	LTE/LTE version in the metal box
Bivias v2 LH SL	Bivias-v2	LTE/HSPA+ version in the metal box
Bivias v2 LC SL	Bivias-v2	LTE/CDMA version in the metal box
Bivias v2 HH SL	Bivias-v2	HSPA+/HSPA+ version in the metal box
Bivias v2 HC SL	Bivias-v2	HSPA+/CDMA version in the metal box

Table 2: Delivery identification

Figure 3: Example of Bivias v2 SL label

5.3 Version of firmware module

In the case of specifications with CDMA module applies that each operator may have a different CDMA network, so it is necessary to generate a special firmware for each operator. Version of the firmware is indicated by two-digit code in the name of the product.

Operator	Code
Poland Orange	01
Poland Plus	02
Czech Republic O2	03
Germany Inet	04
Sweden Net.1	05
Norway Net.1	06
Russia Skylink	07

Table 3: Version of firmware module

Example of trade name: **Bivias v2 HC-01 SL**

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5.4 Ordering codes

For all specifications with CDMA module, order codes are given for the Polish operator Orange. Another operator can be selected by changing two digits according to Table 3 *Version of firmware module* on page 6.

Expansion port	Equipped port	Ordering code
LTE/LTE without expansion port		Bivias v2 LL SL set
LTE/LTE with Ethernet exp. port	PORT1	Bivias v2 LL ETH SL set
LTE/LTE with SWITCH exp. port	PORT1+PORT2	Bivias v2 LL SWITCH SL set
LTE/LTE with WIFI exp. port	PORT2	Bivias v2 LL WIFI SL set
LTE/HSPA+ without expansion port		Bivias v2 LH SL set
LTE/HSPA+ with Ethernet exp. port	PORT1	Bivias v2 LH ETH SL set
LTE/HSPA+ with SWITCH exp. port	PORT1+PORT2	Bivias v2 LH SWITCH SL set
LTE/HSPA+ with WIFI exp. port	PORT2	Bivias v2 LH WIFI SL set
LTE/CDMA without expansion port		Bivias v2 LC-01 SL set
LTE/CDMA with Ethernet exp. port	PORT1	Bivias v2 LC-01 ETH SL set
LTE/CDMA with SWITCH exp. port	PORT1+PORT2	Bivias v2 LC-01 SWITCH SL set
LTE/CDMA with WIFI exp. port	PORT2	Bivias v2 LC-01 WIFI SL set
HSPA+/HSPA+ without exp. port		Bivias v2 HH SL set
HSPA+/HSPA+ with Ethernet port	PORT1	Bivias v2 HH ETH SL set
HSPA+/HSPA+ with SWITCH port	PORT1+PORT2	Bivias v2 HH SWITCH SL set
HSPA+/HSPA+ with WIFI exp. port	PORT2	Bivias v2 HH WIFI SL set
HSPA+/CDMA without exp. port		Bivias v2 HC-01 SL set
HSPA+/CDMA with Ethernet port	PORT1	Bivias v2 HC-01 ETH SL set
HSPA+/CDMA with SWITCH port	PORT1+PORT2	Bivias v2 HC-01 SWITCH SL set
HSPA+/CDMA with WIFI exp. port	PORT2	Bivias v2 HC-01 WIFI SL set

Table 4: Ordering codes

Second expansion port is written after first expansion port in the ordering code.

Example:

- Full version with Ethernet and WIFI port: **Bivias v2 LL ETH WIFI SL set**.
- Full version with Ethernet and WIFI port: **Bivias v2 HC-01 ETH WIFI SL set**.

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5.5 Basic dimensions of metal box

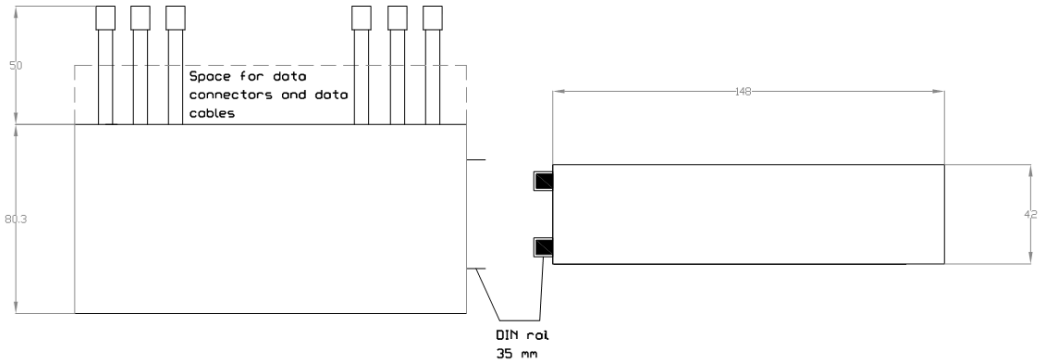

Figure 4: Basic dimensions of metal box

5.6 Mechanical dimensions and mounting recommendations

Mounting recommendations:

- possibility to be put on a work surface,
- DIN rail with clips CKD2 (ELPAC clip SL for metal version) are included.

For the most of applications with a built-in router in a switch board it is possible to recognize two kinds of environments:

- no public and industry environment of low voltage with high interference,
- public environment of low voltage without high interference.

For both of these environments it is possible to mount router to a switch board, the following there is no need to have examination immunity or issues in connection with EMC according to EN 60439-1 ed.2:00 + A1:04.

For compliance of EN 60439-1 ed.2:00 + A1:04 specification it is necessary to observe next assembly of the router to the switch – board:

- for whip antennas we recommend to observe a distance of 6 cm from cables and metal surfaces on every side according to the next picture due to the elimination of interference, while using an external antenna except for the switch-board it is necessary to fit a lightening conductor,

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- before mounting a router on sheet-steel we recommend using an external antenna,

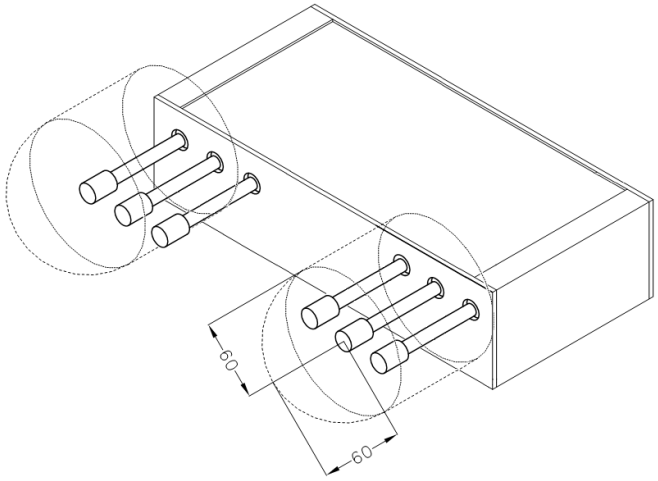

Figure 5: Space around antennas

- For every cables we recommend to bind the bunch according to the following picture, we recommend for this use:
  - Length of the bunch (combination of power supply and data cables) can be maximum 1,5 m. If the length of data cables exceeds 1,5 m or in the event of, the cable leads towards the switch – board. We recommend installing over – voltage protectors (surge suppressors).
  - With data cables they mustn't carry cables with reticular tension ∼ 230 V/50 Hz.
  - All signals to sensors must be twisted pairs.

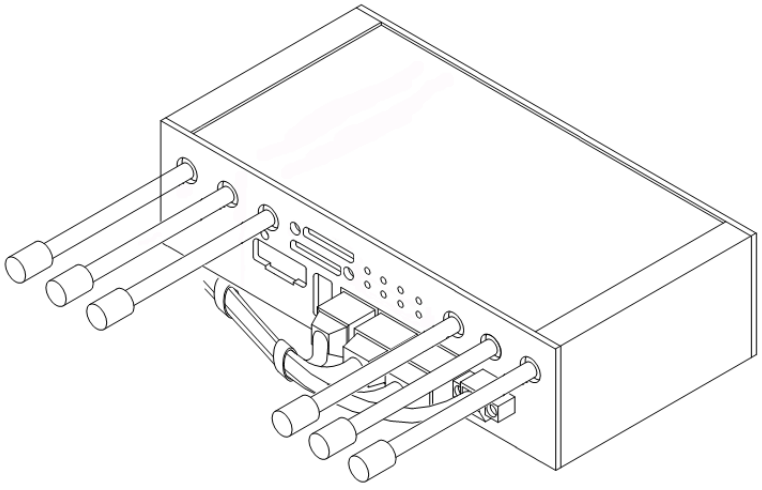

Figure 6: Cable routing

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- Sufficient space must be left before individual connectors for handling of cables,

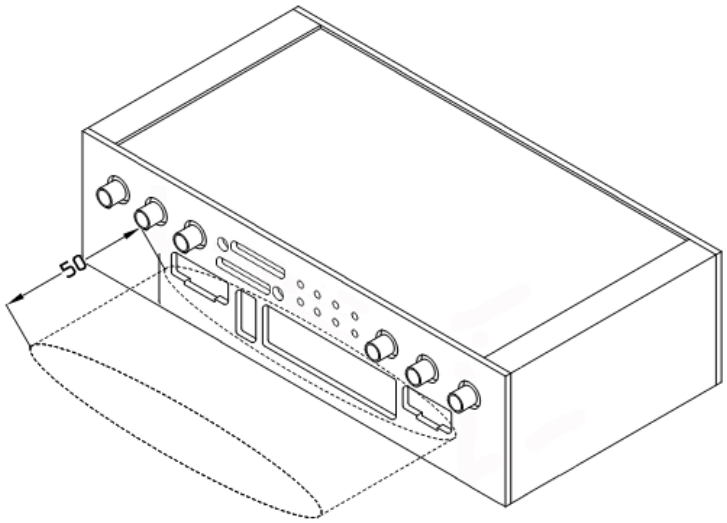

Figure 7: Space in front of connectors

- For correct function of the router we recommend to use in the switch-board earth-bonding distribution frame for grounding of power supply of router, data cables and antenna.

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5.7 Removing from the DIN rail

Default position of CKD2 holder, which is used for mounting the router on a DIN rail, is shown in the following figure:

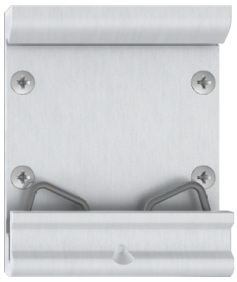

Figure 8: Default position of DIN holder

For removing from the DIN rail it is necessary to lightly push upward the router so that the top part of the CKD2 holder hitched to the DIN rail get out of this rail and then fold out the top part of the router away from the DIN rail.

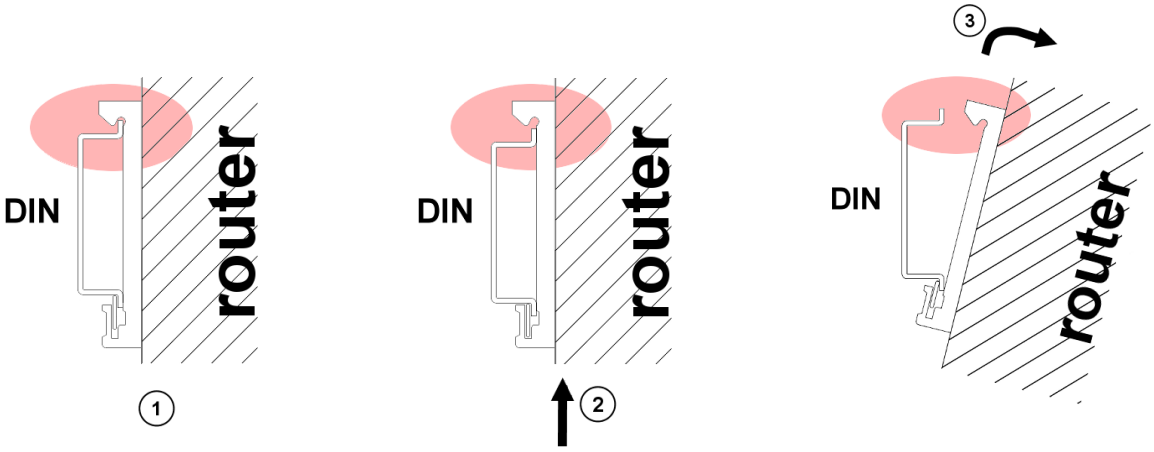

Figure 9: Removing from the DIN rail

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5.8 Description of the front panel

On the front panel is located:

Caption	Connector	Description
PWR	2-pin	Connector for the power supply adapter.
ETH	RJ45	Connector for connection into the local computer network.
PORT1	RJ45	Connector for expansion port ETHERNET or SWITCH.
PORT2	RJ45	Connector for expansion port WIFI or SWITCH.
ANT1	SMA	Connector for main antenna (first module).
DIV1	SMA	Connector for diversity antenna (first module).
ANT2	SMA	Connector for main antenna (second module).
DIV2	SMA	Connector for diversity antenna (second module).
GPS	SMA	Connector for GPS antenna. **Only if router is equipped with module for LTE technology!**
WiFi	R-SMA	Connector for WIFI antenna. **Only if router is equipped with expansion port WIFI!**
USB	USB-A Host	Connector for connection of USB devices to the router. Supports devices with PL-2303 and FTDI USB/RS232 converters.
I/O	3-pin	Connector for connection of the binary input and output.
SIM1	—	Holder for the first SIM card.
SIM2	—	Holder for the second SIM card.

Table 5: Front panel description

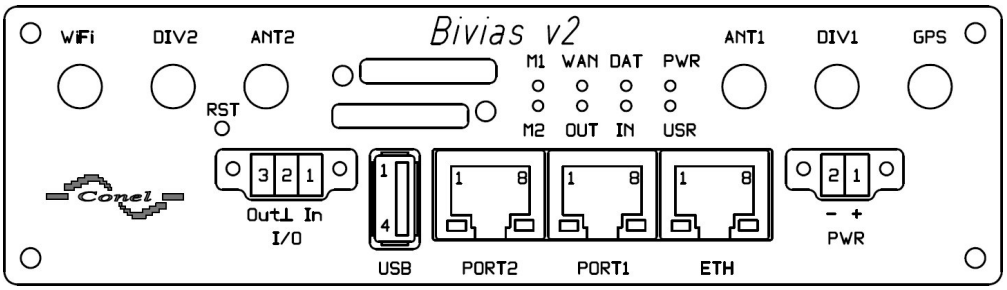

Figure 10: Front panel Bivias v2 SL

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5.8.1 Status indication

About router status inform eight led indicators on the front panel and on every port are two LED indicators, which inform about port status.

Caption	Color	State	Description
M1	Green / Orange	On	Indicates the activity of the first module (green color). In the case of "HC" version with two HSPA+ SIM cards, this LED diode indicates the operation of the first SIM card with green color and operation of the second SIM card with orange color.
M2	Orange	On	Indicates the activity of the second module
PWR	Green	Blinking On Fast blinking	Router is ready Starting of the router Updating firmware
DAT	Red	Blinking	Communication in progress on radio channel
WAN	Yellow	1x flash per sec. 2x flash per sec. 3x flash per sec.	Signal strength is from –50 dBm to –69 dBm Signal strength is from –70 dBm to –89 dBm or difference between neighbours cells is exactly 3 dBm Signal strength is from –90 dBm to –113 dBm or difference between neighbours cells is smaller than 3 dBm
USR	Yellow	Function selected by user	
OUT	Green	On	Binary output active
IN	Green	On	Binary input active
ETH	Green	On Off	Selected 100 Mbit/s Selected 10 Mbit/s
ETH	Yellow	On Blinking Off	The network cable is connected Data transmission The network cable is not connected
PORT	Green	Depends on the expansion port (see user's guide of used port)	
PORT	Yellow	Depends on the expansion port (see user's guide of used port)	

Table 6: Router status indication

State indication of WAN LED is updated every 10 seconds.

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5.8.2 Power connector PWR

Panel socket 2-pin.

Pin number	Signal mark	Description
1	VCC(+)	Positive pole of DC supply voltage (+10 to +30 V DC)
2	GND(-)	Negative pole of DC supply voltage

Table 7: Connection of power connector

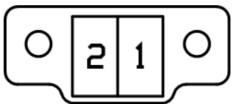

Figure 11: Power connector

Power supply for router is required between +10 V to +30 V DC supply. Protection against reversed polarity without signaling is built into the router.

The power consumption during receiving is 2,6 W. The peak power consumption during data sending is 5,5 W. However, values of consumption can be increased, if some expansion port is eqquipped. For correct operation it is necessary that the power source is able to supply a peak current of 1 A.

Connector on the power cable connects into the power connector on the router head and tightens locking screws (see figure below).

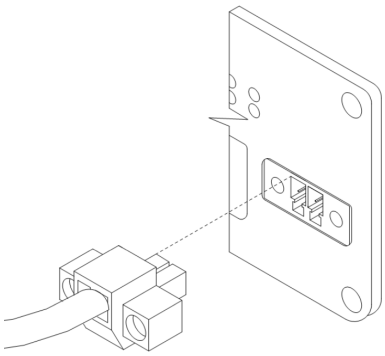

Figure 12: Connection of power supply connector

Circuit example:

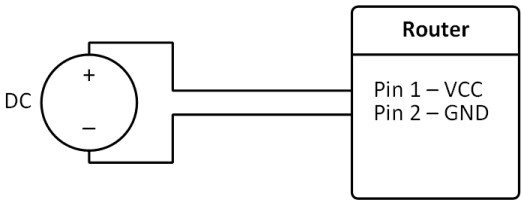

Figure 13: Connection of power supply

The positive pole VCC is marked by a red socket on the power.

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5.8.3 Antenna connector ANT1, ANT2, DIV1, DIV2, GPS and WiFi

Both of main antennas and also both of diversity antennas are connected to Bivias v2 router using the SMA connector on the front panel. There is also available one SMA antenna connector using which GPS antenna can be connected (applies only to versions with LTE module). In case that the WIFI expansion port is equipped, reverse SMA connector (R-SMA) is used.

The router can not operate without connected both of main antennas designated as ANT1 and ANT2.

ANT1 and ANT2 connectors are used to connect main antennas of this router. For connection of diversity antennas are used DIV1 and DIV2 connectors. GPS antenna is connected using the connector of the same name. On user's request, this router can be equipped with WiFi connector for conecting WiFi antenna.

Example of antenna:

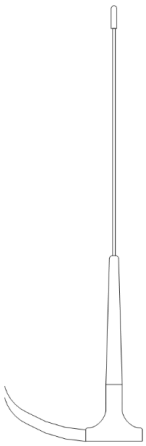

Figure 14: External antenna

For connection the antenna is used SMA connector. The antenna is connected by screwing this antenna to the SMA connector on the front panel of the router (see figure below).

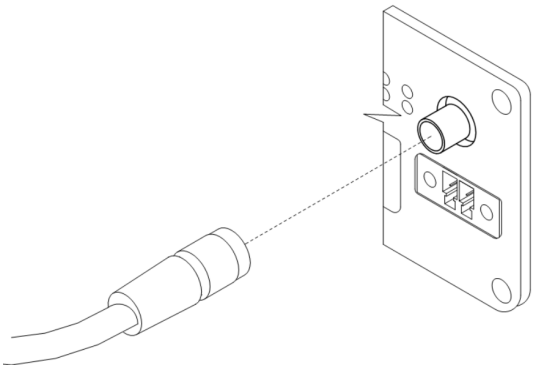

Figure 15: Connecting of the antenna

Diversity antenna improves radio features of the router at low signal strength.

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5.8.4 SIM card reader

The SIM card reader for 3 V and 1,8 V SIM cards is located on the front panel of the router. To initiate the router into operation it is necessary to insert an activated SIM card with unblocked PIN in the reader. The SIM cards might be of different adjusted APN (Access Point Name).

Changing the SIM card:

Before handling of the SIM card turn off the router and disconnect it from power supply.

Press the small yellow button to eject the reader holder. Insert the SIM card into the reader holder and slide it in the reader (see figure below).

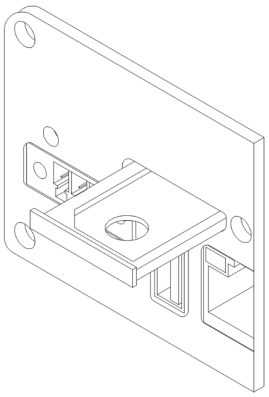

Figure 16: Ejected SIM holder

5.8.5 Ethernet port

Panel socket RJ45.

Pin	Signal mark	Description	Data flow direction
1	TXD+	Transmit Data – positive pole	Input/Output
2	TXD-	Transmit Data – negative pole	Input/Output
3	RXD+	Receive Data – positive pole	Input/Output
4	—	—	
5	—	—	
6	RXD-	Receive Data – negative pole	Input/Output
7	—	—	
8	—	—	

Table 8: Connection of Ethernet connector

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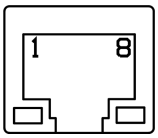

Figure 17: Ethernet connector

ATTENTION! Port ETH is not POE (Power Over Ethernet) compatible!

Ethernet cable plug into the RJ45 connector labeled as ETH (see figure below).

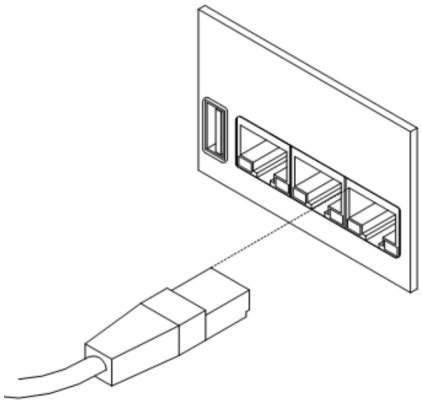

Figure 18: Connection of ethernet cable

Example of the ETH router connection:

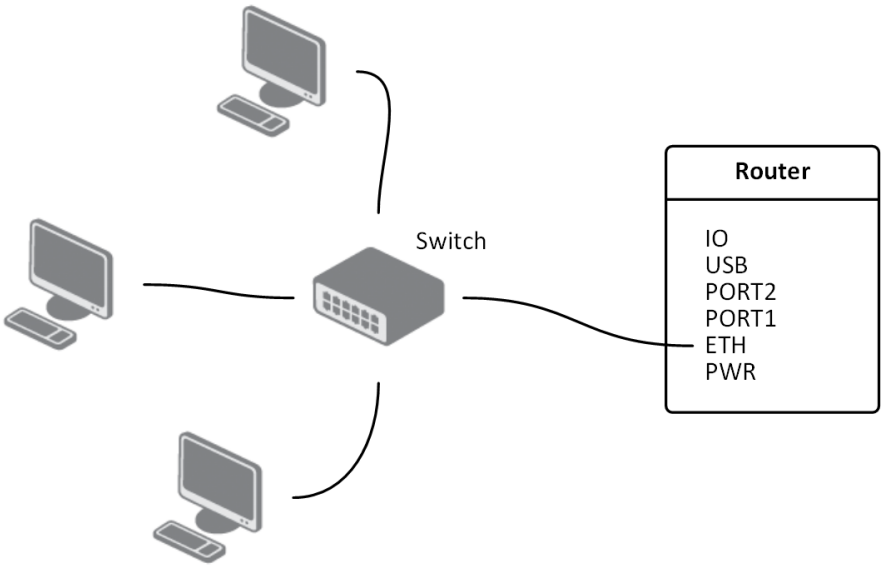

Figure 19: Example of router connection

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5.8.6 PORT1

The PORT1 is equipped on customer's request with one of the offered expansion ports:

- ETHERNET
- SWITCH (together with PORT2)

Description and examples of expansion ports connection can be found in user's guide for corresponding expansion port.

PORT1 cable plug into the RJ45 connector labeled as PORT1 (see figure below).

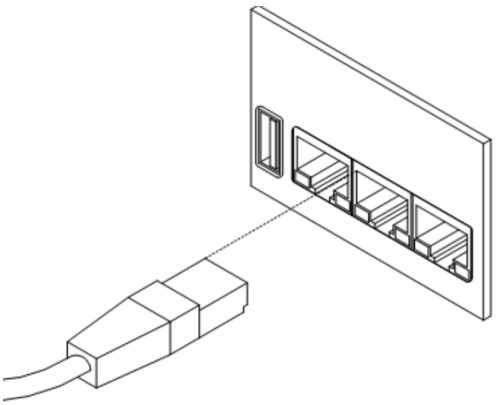

Figure 20: PORT1 cable connection

5.8.7 PORT2

The PORT2 is equipped on customer's request with one of the offered expansion ports:

- WIFI
- SWITCH (together with PORT1)

Description and examples of expansion ports connection can be found in user's guide for corresponding expansion port.

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PORT2 cable plug into the RJ45 connector labeled as PORT1 (see figure below).

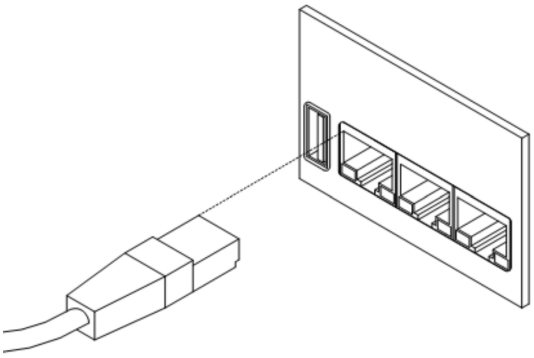

Figure 21: PORT2 cable connection

5.8.8 USB Port

Panel socket USB-A.

Pin	Signal mark	Description	Data flow direction
1	+5 V	Positive pole of 5 V DC supply voltage	
2	USB data -	USB data signal – negative pole	Input/Output
3	USB data +	USB data signal – positive pole	Input/Output
4	GND	Negative pole of DC supply voltage	

Table 9: Connection of USB connector

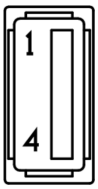

Figure 22: USB connector

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Example of connecting devices with serial interface to the USB:

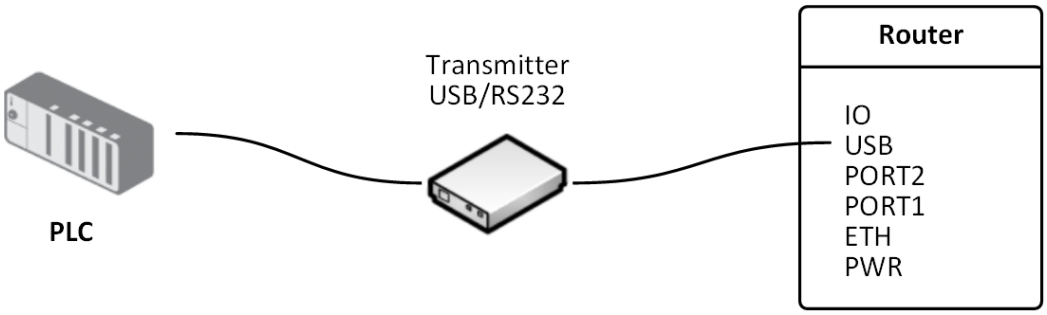

Figure 23: Connection PLC to the router

Example of connecting of USB flash disk to the USB:

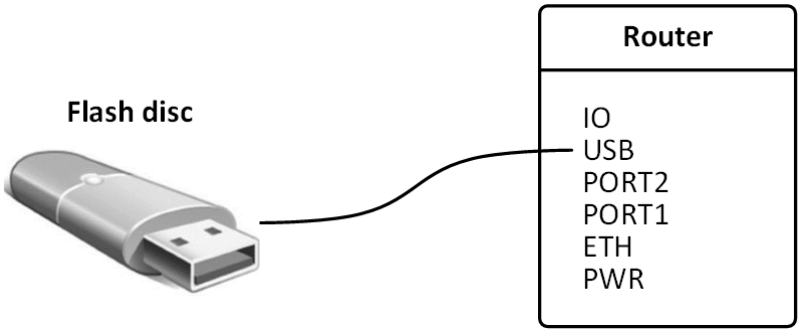

Figure 24: Connection flash memory to the router

5.8.9 I/O Port

Panel socket 3pin.

Pin	Signal mark	Description	Data flow direction
1	BIN0	Binary input	Input
2	GND	Signálová zem	
3	OUT0	Binary output	Output

Table 10: Connection of I/O port

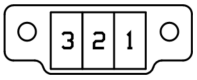

Figure 25: I/O connector

The user interface I/O is for processing of binary input signal and to control (settings) of binary output signal. Binary output is not switched to ground in the default configuration.

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Maximum load binary output is 30 V / 100 mA. The constant current supplied by the binary input is 3 mA.

Connector I/O cable connect into the I/O connector on the router head and tighten locking screws (see figure below).

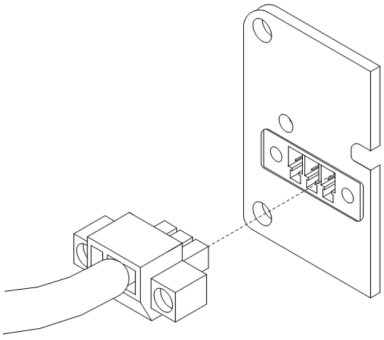

Figure 26: Connection of I/O cable

Circuit example of a binary input or output equipment with router:

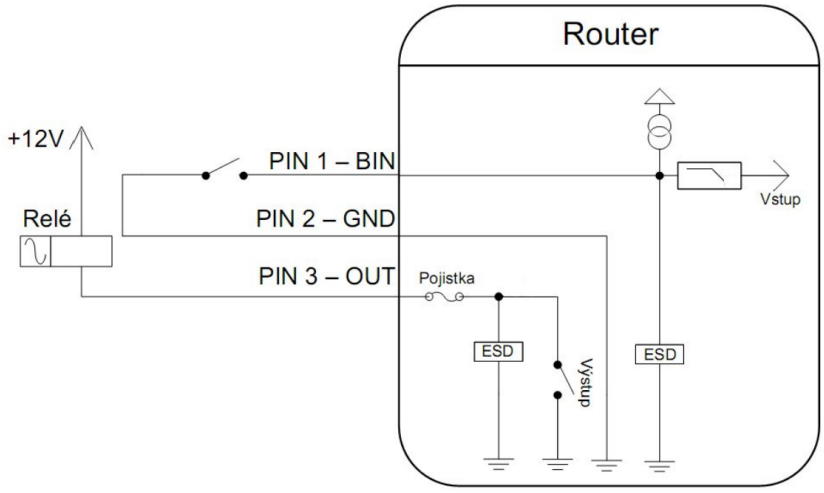

Figure 27: Connection of input and output to the router

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5.8.10 Reset

It is important to distinguish between reset and reboot the router.

Action	Router behavior	Invoking events
Reboot	Turn off and then turn on router	Disconnect and connect the power, Press the *Reboot* button in the web configuration
Reset	Restore default configuration and reboot the router	Press RST button

Table 11: Description of reset and restart router

After green LED starts to blink it is possible to restore initial settings of the router by pressing button RST on front panel. After press button RST it is restoration of default configuration and reboot (green LED will be on).

For pressing the RST button could be used a narrow screwdriver.

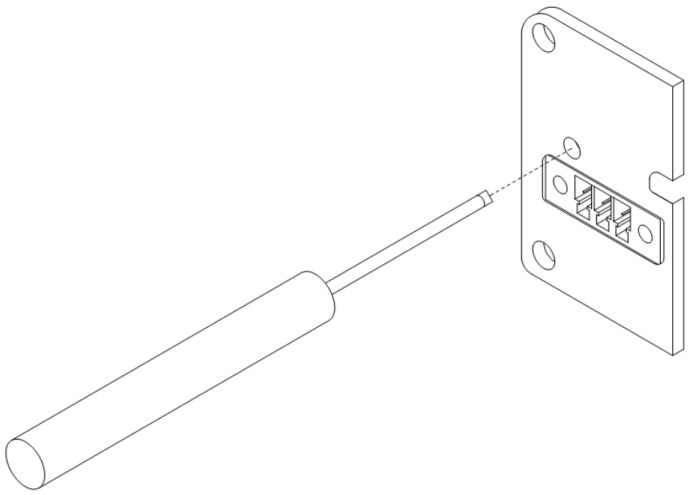

Figure 28: Router reset

We recommend to backup your router configuration (see Configuration manual), because after reset router set configuration to the initial state.

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6. First use

6.1 Connecting the router before first use

Before you give up the router, it is necessary to connect all components needed for the operation of your applications and the SIM card must be inserted (see figure below).

The router can not operate without connected antenna, SIM card and power supply. If the antenna is not connected, router can be demaged.

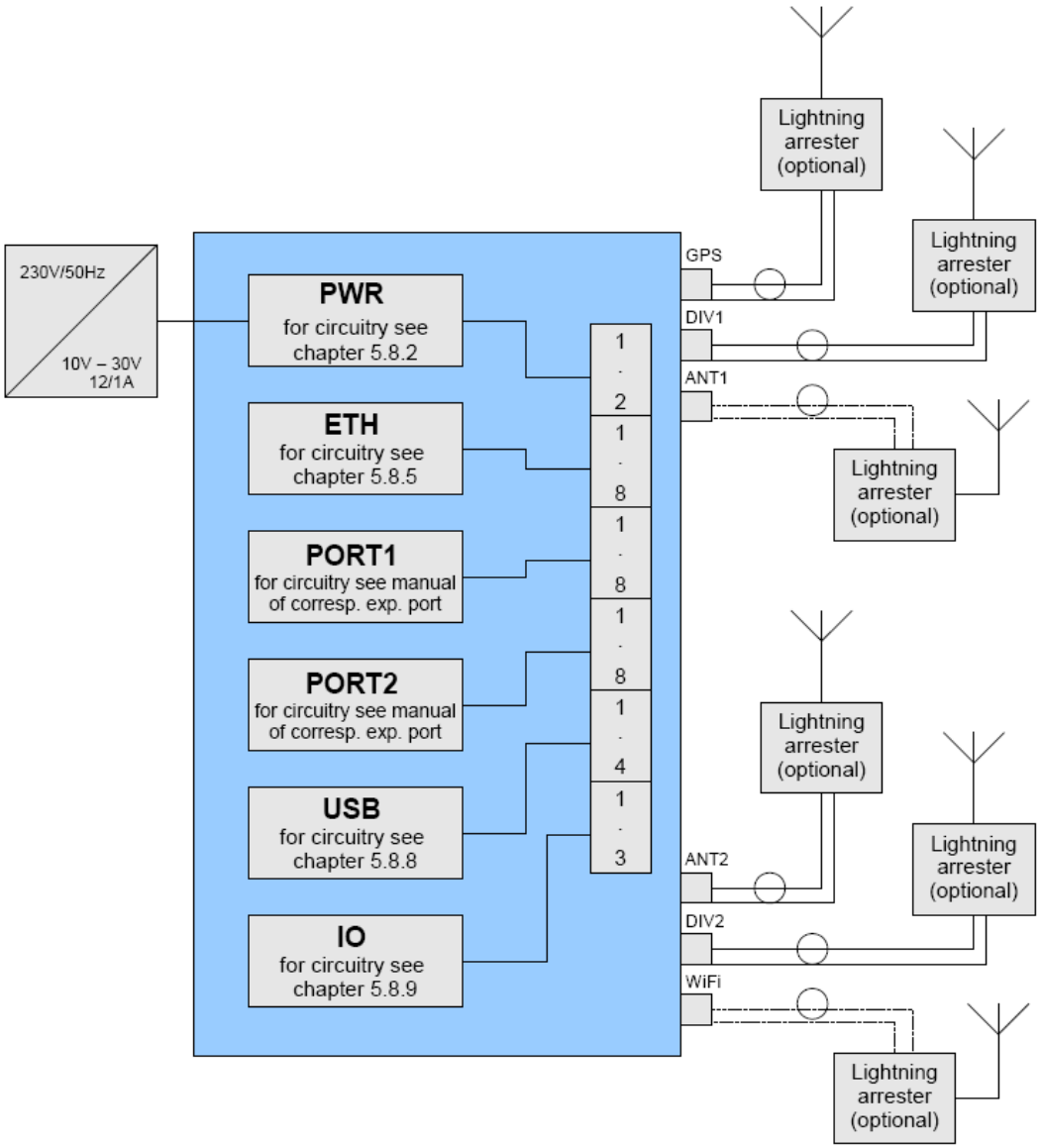

Figure 29: Router connection

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6.2 Start

The router is set up connecting the power supply to the router. In the default setting the router starts to login automatically to the preset APN. Device on the Ethernet port DHCP server will assign addresses. The behavior of the router can be modified by means of the web or Telnet interface, which is described in the configuration manual.

The power consumption during receiving is 2,6 W. The peak power consumption during data sending is 5,5 W. However, values of consumption can be increased, if some expansion port is eqquipped. For correct operation it is necessary that the power source is able to supply a peak current of 1 A.

6.3 Configuration

Attention! If the SIM card is not inserted in the router, then it is impossible to operate. The inserted SIM card must have activated data transfer via technology that one of used modules supports (LTE, HSPA+, UMTS, EDGE, GPRS or CDMA).

6.3.1 Configuration over web browser

Monitoring of the status, configuration and administration of the router can be performed by means of the web interface, which is available after insertion of IP address of the router into the web browser. The default IP address of the router is 192.168.1.1. Configuration may be performed only by the user "root" with initial password "root".

A detailed description of the router settings via the Web interface can be found in the configuration manual.

6.3.2 Configuration over Telnet

Monitoring of status, configuration and administration of the router can be performed by means of the Telnet interface. After IP address entry to the Telnet interface it is possible to configure the router by the help of commands. The default IP address of the router is 192.168.1.1. Configuration may be performed only by the user "root" with initial password "root".

A detailed description of the router settings via the Telnet interface can be found in the configuration manual.

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7. Technical parameters

7.1 Technical parameters of router

Bivias v2		
Complies with standards		EN 301 511, v9.0.2, EN 301 908-1 & -2 & -13: v5.2.1, EN 301 489-1 v1.8.1, EN 301 489-7 v1.3.1, EN 301 489-24 v1.4.1, EN 60950-1: 2006
Temperature range	Function Storage	-30 °C to +60 °C -40 °C to +85 °C
Protection		IP20
Supply voltage		10 to 30 V DC
Consumption	Reception GPRS CDMA LTE/HSPA+	2,6 W up to 3,5 W up to 4 W up to 5,5 W
Dimensions		42 x 80 x 148 mm (DIN 35 mm)
Weight		350 g
Antenna connector		5x SMA – 50 Ohm 1x R-SMA – 50 Ohm (only for exp. port WIFI)
User interface	ETH USB PORT1 PORT2	Ethernet (10/100 Mbit/s) USB 2.0 On customer's request On customer's request

Table 12: Technical parameters of router

7.2 Technical parameters of LTE module

LTE modul	
LTE parameters	Bit rate 100 Mbps (DL) / 50 Mbps (UL) 3GPP rel. 8 standard Supported bandwidth: 5 Mhz, 10 Mhz, 20 Mhz
HSPA+ parameters	Bit rate 21,1 Mbps (DL) / 5,76 Mbps (UL) 3GPP rel. 7 standard UE CAT. 1 to 6, 8, 10, 12, 14 3GPP data compress

Continued on next page

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Continued from previous page

LTE modul	
UMTS parameters	PS bit rate 384 kbps (DL) / 384 kbps (UL) CS bit rate 64 kbps (DL) / 64 kbps (UL) W-CDMA FDD standard
GPRS/EDGE parameters	Bit rate 237 kbps (DL) / 59,2 kbps (UL) GPRS multislot class 10, CS 1 to 4 EDGE multislot class 12, CS 1 to 4, MCS 1 to 9
Supported GPRS/EDGE power classes	EGSM 900: Class 4 (33 dBm) GSM 1800/1900: Class 1 (30 dBm) EDGE 900: Class E2 (27 dBm) EDGE 1800/1900: Class E2 (26 dBm)
Supported channels	GSM/GPRS/EDGE: 900/1800/1900 MHz UMTS/HSDPA/HSUPA/HSPA+: 900/2100 MHz LTE: 800/900/1800/2100/2600 Mhz

Table 13: Technical parameters of LTE module

7.3 Technical parameters of HSPA+ module

HSPA+ modul	
HSPA+ parameters	Bit rate 21,1 Mbps (DL) / 5,76 Mbps (UL) 3GPP rel. 7 standard UE CAT. 1 to 6, 8, 10, 12, 14 3GPP data compress
UMTS parameters	PS bit rate 384 kbps (DL) / 384 kbps (UL) CS bit rate 64 kbps (DL) / 64 kbps (UL) W-CDMA FDD standard
GPRS/EDGE parameters	Bit rate 237 kbps (DL) / 59,2 kbps (UL) GPRS multislot class 10, CS 1 to 4 EDGE multislot class 12, CS 1 to 4, MCS 1 to 9
Power classes	EGSM 900: Class 4 (33 dBm) GSM 1800/1900: Class 1 (30 dBm) EDGE 900/1800/1900: Class E2 UMTS/HSPA: Class 3
Supported channels	GSM/GPRS/EDGE: 850/900/1800/1900 MHz UMTS/HSDPA/HSUPA/HSPA+: 850/900/1900/2100 MHz

Table 14: Technical parameters of HSPA+ module

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7.4 Technical parameters of CDMA module

CDMA modul	
CDMA parameters	Rev. A: Bit rate 3,1 Mbps (DL) / 1,8 Mbps (UL) Rev. B: Bit rate 14,7 Mbps (DL) / 5,4 Mbps (UL) Backward compatible with Rev.0
Transmit power	+23,0 dBm ∼ +30,0 dBm
Supported bands	450MHz (Sub band A,B,L) 800MHz & 1900MHz dual or single

Table 15: Technical parameters of CDMA module

7.5 Technical parameters of GPS

GPS specifications	
Antenna	50 Ohms – active, passive
Protocols	NMEA 0183 v3.0
Frequency	1575.42 MHz
Sensitivity	Tracking: -161 dBm* Acquisition (Assisted): -158 dBm** Acquisition (Standalone): -145 dBm**
Acquisition time	Hot start: 1 s Warm start: 29 s Cold start: 32 s
Accuracy	Horizontal: < 2m (50 %); < 5 m (90 %) Altitude: < 4 m (50 %); < 8 m (90 %) Velocity: < 0.2 m/s

Table 16: Technical parameters of GPS

* Tracking sensitivity is the lowest GPS signal level for which the device can still detect an in-view satellite 98 % of the time when in sequential tracking mode.

** Acquisition sensitivity is the lowest GPS signal level for which the device can still detect an in-view satellite 50 % of the time.

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7.6 Technical parameters of processor

32b ARM mikroprocesor	
Memory	512 Mb DDR SDRAM 128 Mb FLASH 1 Mb MRAM
Interface	Serial interface RS232 Ethernet interface 10/100 Mbit/s USB 2.0 interface

Table 17: Technical parameters of processor

7.7 Technical parameters I/O port

32b ARM mikroprocesor		
Input/Output	Binary input Binary output	Reed contact with trigger level 1,3 up to 1,4 V 120 mA / max. 30 V

Table 18: Technical parameters I/O port

7.8 Technical parameters of expansion port

Technical parameters of the expansion ports are specified in separate manuals for expansion ports.

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8. Recommended literature

[1] Conel: **Start guide**,
[2] Conel: **Configuration manual**,
[7] Conel: **User's manual – Expansion port ETH**,
[8] Conel: **User's manual – Expansion port SWITCH**,
[9] Conel: **User's manual – Expansion port WIFI**,
[12] Conel: **Application guide – Expansion port mounting**,
[13] Conel: **Application guide – Programmer guide**.

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9. Possible problems

Some network cards are able to be set in situation, when it is not possible to connect the router. It is possible to solve this problem in the following steps:

- hand by selection communication rates 10 MB/s in property network cards,
- connect router over switch,
- start computer only after finalizing the start of the router.

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10. FAQ

- ✍ I can't get from internet on equipment, which is connected to router and I have NAT enabled.
  - *The device's gateway has to be configured as the router.*
- ✍ Router resets itself, connection on Ethernet fails.
  - *It is necessary to use an antenna, which will be situated far from power supply.*
- ✍ I don't get on web server at NAT.
  - *The remote http access of the router has to be disabled, default server address has to be your web server and the gateway of the web server has to be the IP of router.*
- ✍ PPP connection fails.
  - *Check signal power. If signal power is weak, you will have to use a better antenna. If the environmental cells have a similar signal it will be necessary to use a directive antenna. Signal levels have to be in the range -50 dBm and -90 dBm.*
  - *It is necessary to set ping, which will check the connection and, in the case of fail ping, restart connection.*
- ✍ PPP connection won't be established.
  - *Recheck GPRS settings - APN, name, password and IP address.*
  - *Try to enter PIN – verification if the SIM card hasn't set PIN code.*
  - *In private APN it is appropriate to switch the DNS server send off.*
  - *Switch log system on and observe where the error turns up.*
- ✍ Connection fails on Ethernet or connection isn't establishing.
  - *On ethernet interface of the router it is possible to switch auto negotiation off and set a rate and duplex by hand.*
- ✍ DynDNS not function.
  - *In private APN not functional.*
  - *If the same IP address is recorded in your canonic name as dynamically assign address, it means that the operator is using NAT or firewall.*
  - *NAT is possible to verify by the help of the ping on address of your server with static IP address and by the help of the router address verify and address in ping.*
  - *Firewall is possible to verify, for example by remote access on web interface.*

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- *The operator doesn't give out address DNS servers and without DNS server's it is impossible to connect to server dyndns.org. In log system will be this message:*
  - *DynDNS daemon started*
  - *Error resolving hostname: no such file or directory*
  - *Connect to DynDNS server failed*

✍ IPSec tunnel is establishing but communication doesn't function.

- *Probably it is badly set up route conditionals of connected equipment or it is bad set up GW.*

✍ FTP doesn't function.

- *Router doesn't support the active FTP mode, supports the passive mode only.*

✍ L2TP or IPSec isn't establishing.

- *Verify the reason in the log system.*

✍ I switched the router to offline mode by the SMS message, but the router is in online mode after restart.

- *Control SMS messages don't change the router configuration. For example, if the router is switched to offline mode by SMS message the router will be in this mode up to next restart. This behaviour is the same for next all control SMS messages.*

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11. Customers support

You can find current information about this product on our website:

www.conel.cz

Upkeep-advices:

- The SIM-card must be handled carefully as with a credit card. Don't bend, don't scratch on this and do not expose to static electricity.
- During cleaning of the router do not use aggressive chemicals, solvents and abrasive cleaners!

Conel Company hereby declares that the router narrated in this user's guide fits all basic demands of directive 1999/5/EC (R&TTE).

Router fits values of coefficient SAR defined by association ICNIRP and values of "About protection of health before non-ionized radiation".

CE Declaration of conformity was issued and it is possible to find it on the enclosed CD or at producer.

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